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SPACE CENTER Roundup

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Astronaut Candidate Class of 2000 to be named

The tension is mounting as the JSC Astronaut Selection Office enters the homestretch in naming the NASA Astronaut Candidate Class of 2000.

This process takes place every other year. This year 3,014 applications were received by the July 1 deadline.

“Our plan is to select candidates every two years in the odd numbered years,” said Duane Ross, NASA manager, Astronaut Selection Office. “We establish a deadline for applications near the first of July. At that time we consider all of the applications that we have received. We continue to accept applications after that date, but they will be considered for the next selection.”

Teresa Gomez, NASA assistant manager in the Astronaut Selection Office, reviewed this year’s batch of applications to ensure that the candidates met basic qualifications. A total of 2,644 applicants qualified. “Once we determine that the applicant meets the basic qualifications, then the information on the application is entered into a database,” said Gomez. The database is essential in managing the enormous amount of information that the office receives.

At this point in the process, the JSC director establishes the Astronaut Candidate Selection Rating Panel comprised primarily of current astronauts who have space flight experience. This year’s panel

of 22 people reviewed applications during July and August to determine highly qualified applicants. A total of 388 were deemed to be from such individuals.

Upon completing this task, the panel is disbanded and the center director appoints the Astronaut Candidate Selection Board made up of astronauts and members of NASA management. In addition, at this point in the process, the Astronaut Selection Office gathers information from references listed on applications from the highly qualified individuals. Additional medical information is also gathered as necessary.

The Astronaut Candidate Selection Board reviewed applications from highly qualified applicants during the past two months to select candidates to be interviewed. The group of 388 highly qualified individuals will be narrowed down to 120 applicants who will be brought to JSC for interviews with the selection board.

Narrowing the list from those applicants judged to be highly qualified to those who will be interviewed is a difficult task.

“The key qualification we look for is how related and how applicable a person’s experience is to the kind of job that astronauts do,” said Ross. “If the application and the references indicate that the candidate is a team player and is adaptable to different kinds of situations and environments, that information is as important as a person’s educational background.”

The key is to have a background in all areas. Academic achievement, participation in athletics, volunteer work in the community—all of these factors are considered.

Weeklong interviews and medical examinations will be conducted with groups of 20 applicants. The Astronaut Selection Office anticipates that all 120 interviews will be completed by the end of January.

Interviews indicate what the candidate is like as a person. “We’re selecting people who will fly with each other and live together on orbit for long periods of time,” said Ross. “They have to be team players who can get along with others very well.”

The next astronaut candidate class will be announced in March or April 2000. The astronaut candidates will report for duty to JSC next summer.

Pilot astronauts serve as both space shuttle commanders and pilots, while mission specialists, working with the commander and pilot, have overall

responsibility for the coordination of shuttle operations in the areas of crew activity planning, consumables usage, experiment and payload operations, and space station assembly and operations.

Mission specialist and pilot astronaut candidates must hold a bachelor’s degree from an accredited institution in engineering, biological science, physical science, or mathematics. Mission specialist candidates must possess at least three years of related, progressively responsible, professional experience. Pilot astronaut candidates must have at least 1,000 hours pilot-in-command time in jet aircraft. Mission specialist applicants must be able to pass a NASA Class II space physical. Pilot candidates must be able to pass a NASA Class I space physical.

Mission specialist candidates must be between 58.5 and 76 inches in height, while pilot astronaut candidates must be between 64 and 76 inches. There is no age limit. The average age of selected applicants is 35.

Selected applicants are designated astronaut candidates and assigned to the Astronaut Office at JSC. The astronaut candidates undergo a one- to two-year training and evaluation period during which time they participate in a basic astronaut training program designed to develop the knowledge and skills required for formal mission training upon selection for a flight. Pilot astronaut candidates maintain proficiency in NASA aircraft during their candidate period.

NASA accepts astronaut candidate applications on a continuous basis and plans to make selections every two years as needed. Military applicants must apply through their respective military service. JSC has an agreement with the services that active duty personnel will not be considered unless they have been nominated.

Application forms and other information are available through the World Wide Web at the following address:
<http://www.jsc.nasa.gov/ah/jscjobs/aso/ascan.htm>

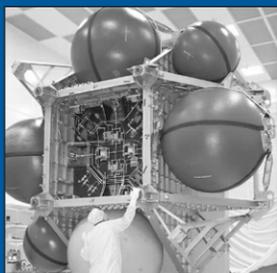
Completed applications must be mailed to NASA, Johnson Space Center, Astronaut Selection Office, Mail Code AHX, 2101 NASA Road 1, Houston, TX 77058.

For more information, contact the Astronaut Selection Office at 281-483-5907.



JSC Photo S99E11915 by Robert Markowitz

Teresa Gomez and Duane Ross have managed the astronaut candidate selection process since 1984.



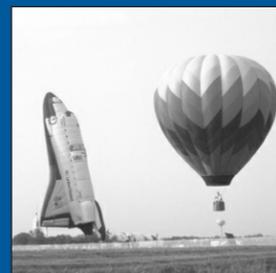
Interim Control Module nears completion.

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Nutritionists examine role of diet in space.

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Open House photo contest winners.

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Station ICM team completes first milestone

By Nicole Cloutier

Flight controllers for the Interim Control Module, in conjunction with Electronic Systems Test Laboratory and Naval Research Laboratory engineers, recently completed successful testing of MCC-Houston's ICM commanding capability. ICM is a contingency propulsion module for the ISS that's being designed and built by the NRL in Washington, D.C. The ICM will provide attitude control and reboost capabilities for the International Space Station.

"This was the first integrated test for the ICM communication system and a lot was accomplished," said Brian T. Smith, ICM flight controller and MOD lead for the test. "It was a very well orchestrated test."

Although the team completed a battery of smaller tests with both NRL and the ESTL in the months before to prepare for the test, this was the first time controllers tied in MCC with the tracking and data relay satellite

system and "talked" to the ICM. Teams from MOD, NRL, Goddard Space Flight Center, and White Sands Complex all participated in the week long test to try out the independent command system.

"The command system used by the ICM in the MCC is completely independent of the existing command system used by the ISS or shuttle," said Bryan Lunney, group lead of ISS Motion Control Systems. "In fact many things about the ICM are quite unique."

The ICM is actually a modified version of the Shuttle Launch Dispenser, a shuttle-deployed propulsion system originally designed by engineers at the NRL for the National Reconnaissance Office. In the late 80s, the SLD was

reconfigured for launch on a Titan launch vehicle and renamed the Titan Launch Dispenser. Some of its characteristics have been changed due to NASA's human space program. For instance, to adapt to ISS's changing center of gravity and mass, the ICM uses a three-axis stabilization system versus the spin-stabilization designed in the earlier version. Because of that, the team also needed to incorporate propellant management devices for the tanks. And to meet the human space program redundancy requirements, a new command and control architecture was developed and incorporated.

"Within MCC the biggest difference is the ICM's dedicated front end processor and command system," said Eric Gallagher, ICM flight controller for the Command Telemetry and Data Handling system. "Additionally, unique MCC hardware and software tools have been acquired to support ICM's capability to process stored command sequences."

Another difference with the ICM is that controllers need to be knowledgeable with all of the subsystems, not specialized for one subsystem exclusively as with the station program.

"The cross training is fairly unique in the flight control world," added Smith. "An ICM controller will have the opportunity to learn many subsystems and fly them all at the same time. It's a challenge, but it's also what attracted each person to come work on the ICM."

JSC has a core team of 10 flight controllers working on ICM, but that number is expected to grow by the end of the year. ICM could fly as early as 2A.3 and to meet that timeline, members from JSC's ICM flight controller team rotate to the NRL for two-week tours of duty.

Kevin Metrocavage and Kristin Geeza,

both of the ISS Motion Control Systems Group, have been resident at NRL in Washington, D.C. for the past few months as the ICM flight controller representatives for MOD.

"It's been a real education for me personally, and for our team," notes Metrocavage, also ICM propulsion lead. "By being up at NRL, it's given us the opportunity to have some good 'hands-on' experience with how the hardware operates. I'm really looking forward to this fall when the ICM subsystem functionality testing is in full swing."

"Typically, you're pretty well divorced from the engineers who build the systems," said Smith of the current arrangement. "But on this project we actually sit with the NRL engineers in the lab, in their meetings with them while they discuss problems, ideas or ways to make the ICM safer and that is where we get a lot of our knowledge."

Likewise, it's rare that the engineers who design systems actually play a part in the product's actual manufacture, but at the NRL, you'll find the JSC design engineers are helping to build the ICM at the site.

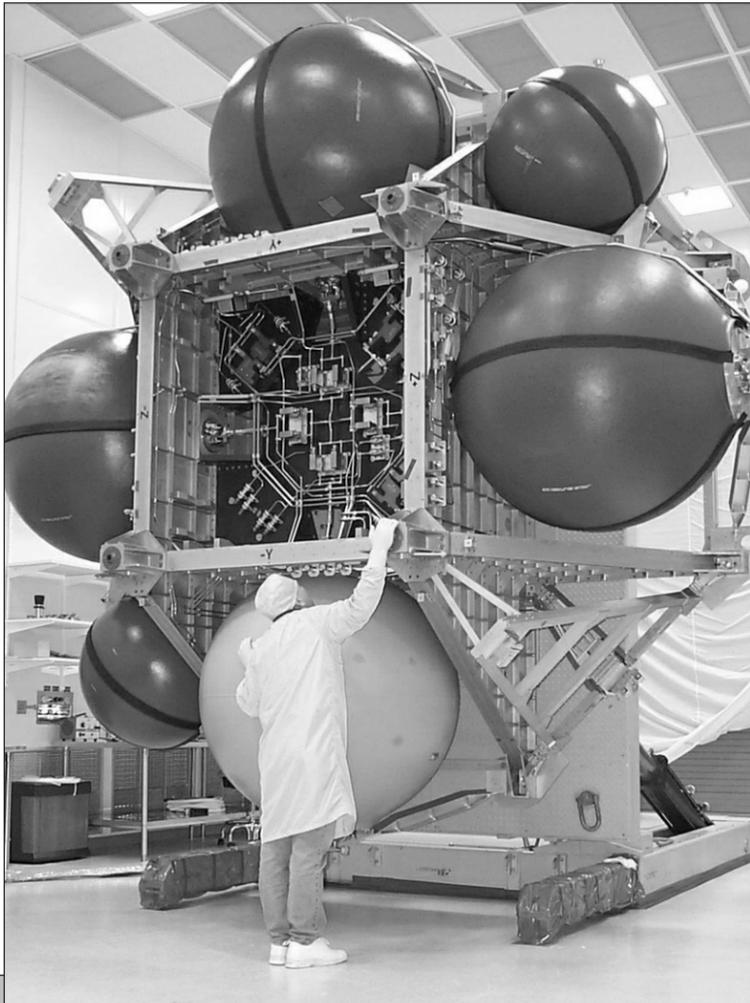
Lee Graham, the NASA deputy project manager resident at NRL, has seen the daily efforts of the working relationship between NASA and NRL.

"Both sides of this partnership have a very strong drive for mission success and both sides have developed a solid respect for the other. A lot of people, and especially the MOD folks working the ICM, have had a direct and significant contribution to this. An added benefit of the NASA and NRL partnership, as many people have already said, is that you get to see and work the whole gamut here from design, to build, to integration, to test and, finally, to operation. Nothing can match being right there with the flight vehicle as it progresses towards flight."

The ICM team is now concentrating their efforts towards its first vehicle level end-to-end test scheduled for December 1999. Following the end-to-end test, the ICM will be shipped to the Kennedy Space Center in early 2000 where it will undergo additional testing and integration. The ICM is currently scheduled for launch no earlier than August 2000 pending the availability of the Russian Service Module. ■

The Interim Control Module provides a unique project for JSC engineers partnering with the Naval Research Laboratory. Shown here are JSC team members standing, from the left, Mike Hamilton, Randy Hubbard, Sheik Allil, Kevin Metrocavage, Mike Lammers, Rob Alexander, and John Bendle. Seated from the left are Brian Smith, Eric Gallagher, Stan Siemienski, and David Randall.

Not shown are Mark Jenkins, Kristin Geeza, Bruce Powers, Adam Dershowitz, Stein Cantrell-Avlos, Bretty Maryott, Robert Frost, and Molly Meyer.



A Naval Research Lab engineer inspects the Interim Control Module, a contingency propulsion component for the ISS.



JSC Photo S99-10462 by James Blair

Chill out at work



AVOIDING STRESS
Automation, Robotics & Simulation Division Managers, from left, Henry Kaupp, Charley Price, Charles Gott and Andre Sylvester dress up like Bill Chill to avoid stress.

PEOPLE IN THE NEWS**JSC engineers help community business***TOP matches business problem with space technology*

A local aviation seat belt manufacturer is the latest company to take advantage of the acclaimed Technology Outreach Program sponsored by NASA and the Clear Lake Area Economic Development Foundation.

In a ceremony in August, TOP organizers unveiled their newest success story, Aircraft Belts Inc., and explained how the acclaimed program helped this small Kemah business champion a large technical hurdle.

"TOP is unique," said Jim Reinhartsen, president of CLAEDF. "We want companies, like ABI, to understand that NASA is here to help them and we have a real desire and mission to help them."

As a result of increasingly stringent FAA regulations and customer requirements, ABI was in need of updated testing and verification equipment for its aviation restraints and harnesses. Specifically, the company sought testing equipment that could help them verify the forces on different components of the belt assembly. However, there was no commercially available equipment to fit their needs. The alternative was to design test equipment themselves.

"We know seat belts," said Norman Ballard, vice president

and quality control director for ABI. "But we don't necessarily know testing equipment. We were running into dead ends trying to find solutions readily available on the market."

After one call to Cathy Kramer, TOP executive director, Ballard said he had a response in less than 24 hours. Within two weeks, Ballard had met with JSC engineers and the process began.

"By sharing our engineering test procedures, which emphasize safety, quality control and accurate measurements, we showed ABI how we do business here and how that leads to a quality product," said Rodney Rocha, manager for the JSC's Structural Test Lab in Bldg. 13.

JSC's Joe Riccio, Juan Padron and Rocha all were part of the team to help the company. They examined the ABI testing

equipment and then brought ABI on site to show them NASA's testing facilities, including equipment used for testing the lines on the X-38 parafoil.

"ABI needed a miniature version of one of the test setups we have in the JSC Structural Test Lab where components may be subjected to forces ranging from a few pounds to hundreds of

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Aircraft Belts Inc., a local company with nearly 30 employees, is the latest company to tap TOP for free technical assistance. Through the TOP partnership, three JSC engineers helped ABI develop new testing methods and hardware for its seat restraints and harnesses.

Local Embry-Riddle site announces graduates, expands program

School is out for three NASA employees who graduated from Embry-Riddle Aeronautical University this month. Nina Duncan, a quality specialist, received a bachelor's degree in professional aeronautics and Mike Engle, operations data file manager, and Danny Ewing, MOD aerospace engineer, each received master's of aeronautical science degrees. The three are the first to graduate from the center, which opened during the summer of 1997.

"It is very rewarding to have our first class of graduates," said Larry Powers, who relocated from New Mexico to direct the Houston center. "Embry-Riddle always takes pride in assisting students to realize their academic goals."

The Houston center also has added a new specialization in space studies to its master's of aeronautical science program which already includes specializations in

operations, management, safety, and human factors. Other degree programs include bachelor's of science in management of technical operations, and master's of science in technical management, which is designed for entry and mid-level managers in a technical environment.

"The response to ERAU programs has been overwhelming," said Powers. "Students and employers see the results of what was taught in class in the evening being used in the workplace the next day."

The ERAU Houston Center has nearly 200 students in the program, 30 percent of which are working on graduate level coursework.

Registration for the next term is September 27. Classes begin October 18. For more information about ERAU's Houston Center, visit their Web site at <http://ec.db.erau.edu/cce/centers/houston>



JSC Photo S99-09475 by Robert Markowitz

JSC employees, from left, Mike Engle, Nina Duncan, and Danny Ewing are the first graduates of Embry-Riddle's Houston Center.

'Lost in Space' star tours JSC

JSC Photo S99-10637 by James Blair

LOCKHART VISITS JSC—Actress June Lockhart, foreground, who played the role of the mother in TV's "Lost in Space" series, and her granddaughter, Christianna Triolo, visited JSC late last month where they toured the Mission Control Center and the Sonny Carter Training Facility. Craig Schafer, background, manager, Microgravity Science, shows the visitors the International Space Station Trainers in Bldg. 9B.

Astronaut Collins receives Comets' jersey

JSC Photo S99-10968 by James Blair

AN HONORARY COMET—Leslie L. Alexander, president, Houston Comets, presents a team jersey to Col. Eileen Collins, commander of STS-93, at halftime during the team's championship playoff game September 4 at the Compaq Center.

Preparing for extended space flight: nutrition and the human body



As lengthy stays aboard the International Space Station loom in the near future, and plans for potential missions to Mars begin to unfold, the need for a better understanding of nutritional requirements for astronauts during extended-duration space flight becomes evident.

Nutrition is key to maintaining physiology on the ground, and it is even more critical in flight. The responsibility for overseeing this critical area is that of the scientists in the JSC Nutritional Biochemistry Laboratory, whose charge is to define nutritional requirements for space flight—that is, determine how many calories and other nutrients a crewmember needs in a given day, and how these requirements are altered in flight versus on the ground.

Current issues of primary concern to the researchers involve the astronauts' dietary intake, bone loss, and iron absorption in space.



Diet

“A problem that we've seen repeatedly in flight is that the crewmembers do not eat as much as we'd like them to, and that's our first concern,” said Dr. Scott M. Smith, lead for the JSC Nutritional Biochemistry Laboratory.

Crewmembers typically eat a high carbohydrate diet, and proportions of macronutrients (i.e., protein, carbohydrate, and fat) generally meet standard recommendations. However, food and fluid intake decrease during

space flight, despite the fact that pre-flight and in-flight energy requirements are the same. The balance between energy intake and energy expenditure regulates body weight. In space flight, where intake is often reduced and expenditure is unchanged or increased, there is a loss of body mass. This may have significant effects on medical and research studies, and also affect crew health.

As space flight evolves from short-duration space shuttle missions to extended habitation aboard the ISS, NASA will be challenged to provide astronauts with more palatable and more nutritious food. The development of advanced food technologies is essential for successful long-duration missions.

Toward that end, NASA recently selected Iowa State University to head up research that could lead to better food for astronauts and safer, more nutritious packaged foods for everyone. Iowa State will head the National Food Technology Commercial Space Center, working

to improve food for long-duration space missions and to enhance the packaging, preparation and storage of commercially produced food.

JSC will sponsor the commercial space center. Commercial partners in the center will provide additional resources in a collaborative effort to develop the new technologies.

Improvements in the shelf life and safety of food for space flight could lead to similar improvements in commercially produced and packaged food available to the public. Partnerships with the private sector will be essential elements of the Food Technology Commercial Space Center, in addition to the academic institution's own resources.

“A consortium of universities and companies in the food processing industry will work with NASA to ensure that the foods that are developed will be usable for both space and terrestrial purposes,” said Dr. Dennis Olson, director of the center. “Diminishing the weight of foods to be carried

into space and decreasing the amount of waste produced are important concerns. Of course palatability is of key importance.”

Nutrients studied in space flight include water, sodium, potassium, calories, protein, calcium, and iron. Water is extremely important to maintain hydration and is essential to prevent the space flight medical problem of kidney stone formation. Astronauts frequently do not drink enough. They need at least eight cups of fluids from drinks and food. Without adequate calories and protein, the astronauts cannot maintain their muscle strength and actually lose muscle tissue. Obviously this is important for good health and performance during space flight and critical for space walks and returning to Earth.

Furthermore, calories, protein, and calcium are essential for bone health. Water, sodium and potassium are essential for cardiovascular function. Research with these nutrients has been completed throughout the human space program with recent work on STS-95 and the Shuttle-Mir program. Further work will be completed on upcoming shuttle flights and aboard the ISS.



Bone Loss

The ability to understand and counteract weightlessness-induced bone loss remains a critical issue for astronaut health and safety during and after extended-duration exploration missions.

“Bone loss is one of the more critical problems that we face in preparing crews for long-duration missions,” said Smith. “A number of other changes occur during short-duration space flight, including vestibular and cardiovascular changes, but those tend to be more acute and tend to be more of immediate impact during re-entry, landing, and in the first days to weeks after the mission.”

Calcium is lost from bones during space flight due to skeletal unloading and insufficient levels of vitamin D. Vitamin D



JSC Photo S99e10114 by Robert Markowitz

Dr. Helen W. Lane demonstrates the conversion of rice grains to food products that will be used for advanced life support. These types of foods will be processed during the BIO-PLEX test bed being built by the Engineering Directorate in Bldg. 29. Also, illustrated is the upcoming NASA book that is an anthology of nutritional research during space flight from the early 1970s to the recent NASA-Mir missions.

plays a critical role in calcium absorption and metabolism. Sunlight, specifically ultraviolet radiation, is essential for synthesis of vitamin D. Spacecraft are heavily shielded to reduce crewmembers' exposure to the harmful types of radiation. Thus, the lack of ultraviolet light during space flight may decrease vitamin D pools in the body, which poses a concern over lengthy missions.

The absorption of calcium is decreased during space flight, further compounding the problem; thus bone loss in space is increased, while bone building is decreased. The recommended daily amount of calcium is 1,000 mg. Typically, the body absorbs 40 to 50 percent of the daily dosage on the ground but only 20 to 25 percent in space.

"We need to be able to identify the mechanisms responsible for bone loss and determine a means to counteract them for future extended exploration missions to become a reality," said Dr. Helen Lane, NASA chief nutritionist. "We can't go to Mars without first developing a countermeasure for bone loss."

Understanding the regulation of bone and calcium metabolism during space flight will be critical for identifying and developing methods for counteracting flight-induced bone loss. The ability to monitor calcium movement in and out of various storage pools throughout the body (blood, bone, etc.) would allow much more detailed and dynamic studies of how the regulatory systems are functioning over time.

During experiments to be conducted during shuttle mission STS-107 and aboard the ISS, researchers will use state-of-the-art tracer techniques to measure calcium kinetic changes before, during and after flight. This method involves the use of two stable isotopes of calcium, one of which is administered orally and the other intravenously. The appearance and disappearance of these isotopes in biological samples (e.g., blood, urine, and saliva) will be documented over the days and weeks

following the doses. Mathematical modeling techniques will be used to monitor the movement of calcium through the body compartments using software developed at the National Institutes of Health. Information gained from these experiments will be critical for monitoring and counteracting the loss of bone mineral during flight, and for understanding Earth-based bone diseases, such as osteoporosis.

In-flight determinations of calcium kinetics have been collected thus far from six people, three from Mir 18 in 1995 and three from the Phase 1C Mir missions in 1997-98. For the Mir 18 crewmembers, calcium absorption during the last week of the 115-day flight was substantially lower than measurements noted pre-flight. Furthermore, absorption did not return to pre-flight levels until three months after return to Earth. Results also show that bone calcium is lost at rates of approximately 250 mg per day during space flight. This loss is due to lower calcium intake, reduced fractional absorption, increased calcium excretion, and increased bone resorption. Recovery continued for many months after flight at a rate slower than the in-flight loss. If it is assumed that the rate of bone mineral loss observed in flight is constant throughout the flight and that the rate of recovery is also constant, it will take about 2.5 times the mission length to recover the lost bone.

Potential countermeasures for in-flight bone loss include vitamin K,

vitamin D, pharmaceutical agents, ultraviolet light treatment and resistive exercise. In a European Space Agency-sponsored study, vitamin K supplementation reduced urinary calcium loss for one Mir crewmember. This may have an impact on bone health during weightlessness, but more data are clearly needed.

Further study is also required to define the efficacy of vitamin D-fortified diets, supplemental vitamin D and the use of in-flight ultraviolet light treatment. Resistive exercise helps build bone mass and a resistive exercise device is planned for use aboard the ISS.



Iron Absorption

"The problem with iron that we see during space flight is the opposite of what we see on the ground," said Smith. "For people on the ground, iron deficiency is a concern. In flight, from the data that we have, it appears that there is abundant iron available for crewmembers. That's a concern because there are negative consequences of getting too much iron."

Upon examining astronauts who have returned from space, researchers have noted high amounts of iron stored in the body. Despite this noted increase, the amount of red blood cells is low. Thus the iron is not serving to build red blood cells during flight; it is just stored.

"We are concerned about iron storage because it can lead to

peroxidation, which could damage the body's DNA," said Lane.

Due to this concern, the amount of iron included in the astronauts' diets has been lowered, but this may prove to be unnecessary. An experiment to be conducted aboard the space station will help determine whether or not iron storage is a problem for space travelers if it is not absorbed into the bloodstream.

Antioxidants (e.g., vitamins A, C, and E) may provide a feasible countermeasure for crewmembers during long-duration space flight. This may help reduce risks associated with high iron, as well as with radiation exposure. Further studies to determine the efficacy of antioxidants will be conducted aboard the ISS.



Conclusion

Researchers have only just begun to scratch the surface of understanding the impact of weightlessness on the human body. A more complete understanding will not only enable the exploration of our universe, but will provide the information needed for the maintenance of human health and treatment of diseases on Earth. ■

For more information:

JSC is publishing a book that contains the significant accomplishments of nutrition in space flight. This book, Nutrition in Spaceflight and Weightlessness Models, edited by Helen W. Lane and Dale A. Schoeller (University of Wisconsin), distributed by CRC Press, Boca Raton, Florida, will be an international distribution.



The JSC Nutritional Biochemistry Laboratory, from left, Diane DeKerlegand, Molly Whitley, Jeannie L. Nillen, Patti Gillman, Barbara L. Rice, Myra D. Smith, Scott M. Smith, Vernell Fesperman and Janis E. Davis-Street.

Ripped from the ROUNDUP

Ripped straight from the pages of old Space News Roundups, here's what happened at JSC on this date:

1 9 6 9

Preliminary examination of the rock and dust samples brought back from the Moon last July has been conducted in the Lunar Receiving Laboratory by a group of university and government specialists who make up the Preliminary Examination Team.

One of the most exciting observations according to the PET "is the great age of the igneous rocks from this lunar region."

The PET group also said that "the chemical composition of Tranquility Base fines and igneous rocks are unlike those of any known terrestrial rock or meteorite."

1 9 7 4

The JSC Solar Observatory has closed and personnel from the NOAA who operated the observatory since it opened in 1970, have moved to Marshall Space Flight Center in Huntsville, Alabama. Built in 1966 for the then Manned Spacecraft Center, the solar observatory was first part of NASA's Solar Particle Alert Network (SPAN), a support operation for the Apollo program. The station is one of seven around the world and was operated by NASA and contractor personnel until the latter Apollo missions in 1970 when NOAA took over operation of SPAN.

1 9 8 9

Kennedy Space Center began battering down the hatches Monday for a potential strike by Hurricane Hugo, but by Thursday predictions for landfall put the storm well north of Cape Canaveral. Even so, *Atlantis*—poised on launch pad 39B—was to remain prepared to be placed in a "ride-out" configuration should the pad area see strong enough winds. To shorten the amount of time required to roll *Atlantis* back to the VAB, the payload bay doors were closed early in the week, launch pad platforms were retracted and loose items were secured.



America Recycles Day set for November 15

"For Our Children's Future...Buy Recycled Today"

The JSC Environmental Stewardship Committee's Recycling Work Group is gearing up to celebrate America Recycles Day on November 15. To build awareness at JSC, the group is planning contests to get employees involved, while teaching them about recycling and buying recycled products at the same time.

There are four chances to win. Once a month until America Recycles Day (September, October, and November), there will be a puzzle or other contest published or mailed out. The first 300 people each month to submit a correct solution will receive a prize. Names of the winners for the three contests will be placed in a pool and a winner will be randomly selected to win the grand prize. Civil servants and on-site contractors working at JSC, Ellington Field, Sonny Carter Training Facility and El Paso Forward Operating Location are eligible.

The puzzle for September is a word search for items that can and cannot be included in our JSC white paper recycling bins. So, while you are solving the puzzle take note of the do's and don'ts of JSC paper recycling. You will receive a copy of the puzzle via a JSC flyer or you can

access it from the JSC internal home page under News and Events.

The theme for America Recycles Day 1999 is "For Our Children's Future...Buy Recycled Today." The theme is based on the goal of America Recycles Day, which is to increase the purchase of recycled-content products and recycling throughout America so that we conserve resources for future generations. We want to make consumers aware of the importance of "buying recycled" and to emphasize the message that you're not really recycling unless you buy recycled products. America Recycles Day promoters challenge all Americans to make a pledge to increase their purchase of recycled content products. For more information about America Recycles Day visit their Web site at <http://www.americarecyclesday.org/>.

Most Americans help the recycling

effort by putting materials in their recycling bin or taking them to a drop-off center. But many people don't realize that another important step to keep recycling working is to "Buy Recycled" or "Close the Loop" by purchasing products made from recycled content materials. Purchasing recycled-content products helps maintain market demand for recyclables and ensures the continuation and expansion of recycling programs everywhere. If consumers purchase more products with recycled content, manufacturers will continue to use it in their products and expand the usage to even more products.

Look for another article about America Recycles Day and the next contest in an October issue of the *Roundup*. If you have any questions about recycling or buying recycled at JSC, contact Jo Kines at x33218. ■



Volunteers needed for human-body measurement study

The Civilian American and European Surface Anthropometry Resource survey is the most comprehensive human-body measurement study undertaken. This survey was conceived by the U.S. Air Force to assist NATO countries in the design and manufacture of defense industry tools and is co-sponsored by more than 20 commercial industry partners. CAESAR is an international study of body sizes and shapes of male and female volunteers between the ages of 18 and 65.

CAESAR anthropometric data collection will be conducted at JSC through October 6. Data will be collected in Bldg. 266, Rooms 109, 110, and 111. Hours of operation are from 7:30 a.m. to 4:30 p.m. Monday through Friday. This effort, conducted by a data collection team from Wright-Patterson Air Force Base, is hosted by the JSC Flight Projects Division. Data is being collected from participating members of the astronaut corps, as well as from volunteers solicited from the civilian and contractor personnel at JSC.

Call 1-888-520-8808 or 281-483-5857 to volunteer.

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thousands of pounds depending on the hardware's test requirements," said Riccio, manufacturing engineer.

The engineers provided design concepts for testing equipment as well as plans for an inexpensive, safety barrier made of Lexan to protect testing staff.

"They put together a very good package of information, which has led us down the road that we are traveling at this point," said Ballard. ABI is now working to implement the designs and plans to have the equipment completed in the next two months.

"Our finished testing equipment will be a lot more comprehensive than our original thoughts," said Ballard. "Working with TOP and the engineers really opened up options we hadn't even considered. And seeing the JSC testing facilities was an eye-opener as far as the range of testing capabilities that existed."

ABI is the fifth client to complete the process since the TOP was founded less than one year ago. "We've already had several hundred [site] visits," said Reinhartsen. "And we've received more than 30 Requests for Technical Assistance."

TOP services are designed to speed the transfer of space technology to the private sector by providing free technical assistance to local small businesses. ■

TICKET WINDOW

Exchange Store hours

Monday-Friday

Bldg. 3 7 a.m.-4 p.m.

Bldg. 11 9 a.m.-3 p.m.

All tickets are nonrefundable.

Metro tokens and value cards are available.

For more information, please call x35350.

The following discount tickets are available at the Exchange Stores

General Cinema Theaters	.....	\$5.50
Sony Loew's Theaters	.....	\$5.00
AMC Theaters	.....	\$4.75
Fiesta Texas	.....adult .. \$18.25 .. (child under 48") ..	\$15.50
AstroWorld One-day Admission	.....	\$21.00
Water World	.....	\$10.75
Moody Gardens (2 events) ticket does not include Aquarium or Pyramid	..	\$10.75
Moody Gardens - Aquarium only	.....	\$9.25
Sea World	.....adult .. \$27.25 .. child (age 3-11) ..	\$18.25
Schlitterbahn Water Park	.....adult .. \$20.75 .. child (age 3-11) ..	\$17.50
Space Center Houston	.....adult .. \$10.25 .. child (age 4-11) ..	\$6.50
(JSC civil service employees free.)		
Space Center Houston Annual Pass	.....	\$18.75
Splash Town Water Park	..... adult .. \$14.50 (child 48" and under) ..	\$11.50

Effective October 1, the JSC Exchange will accept personal checks with a valid Texas driver's license. A NASA badge will no longer be required. There will be a \$25 charge on all returned checks.

NASA hosts conference exploring commercial interest in station living quarters

NASA invited private industry to Houston from Aug. 24 - 26 to participate in a conference that explored potential commercial interest in a government and industry partnership to build the crew habitation module for the International Space Station.

"NASA is dedicated to the commercial use of space and fostering private enterprise on the new frontier," said Dan Tam, special assistant to the NASA administrator for commercialization. "On Earth, it has been demonstrated time and time again that with market support, private industry can do a better job than the government. We expect the same will be true in space."

NASA needs a crew-quarters module that will house at least four crewmembers. The module should also include bedrooms, a kitchen, a pantry, a dining and meeting area, videoconferencing and entertainment equipment, windows, storage space, exercise equipment and a medical examination room.

The Habitation Module Commercialization Conference was held at the Nassau Bay Hilton and Marina Hotel.

The conference explored the formation of a commercial consortium that would own, use and maintain all or part of the module. NASA would be one of many module users and customers of the consortium.

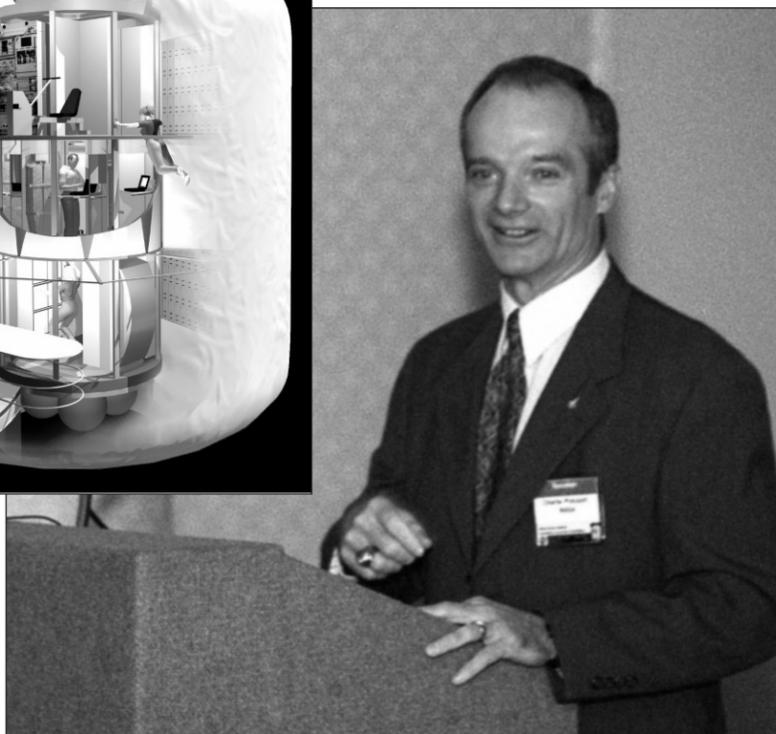
Current station plans specify that the module be a traditional metallic design similar to other International Space Station modules. A more recent NASA concept has proposed an innovative, space fabric version of the living quarters module. Conference participants considered existing designs and new ideas for the module.



The habitation module will be launched from the space shuttle and attached to the station in November 2004. In addition to aerospace industries, NASA is hoping to attract other businesses and

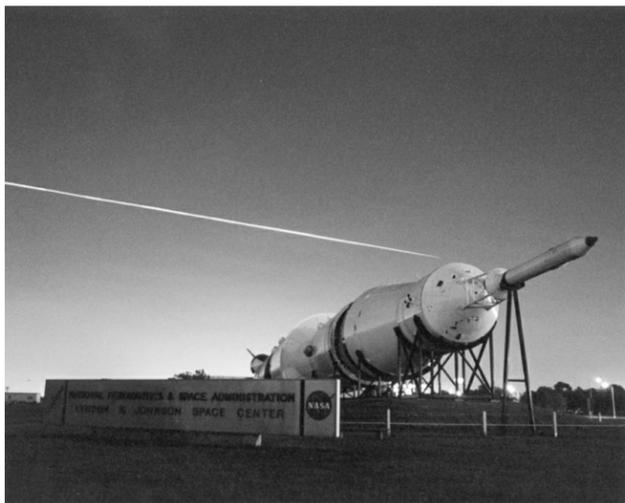
investors to spur innovation in the commercial use of space. These non-aerospace companies may have ideas related to sponsorship, space tourism, entertainment, advertising, education or technology development.

This activity will serve as a pathfinder for other commercial uses of the International Space Station and commercial involvement in other NASA programs. ■



JSC Photo S99-10614 by Bill Stafford

NASA Astronaut Charlie Precourt, chief of the Astronaut Office, addresses those in attendance at the Habitation Module Commercialization Conference, providing a flight crew perspective on the merits of the station's baseline habitation module and the TransHab (inset) concept of a habitation module.



Best of Show
Brian Zemba

Winners of the Open House Photo Contest



Third Place
Harold Robertson



Second Place
Barton K. Gibson



First Place
Barton K. Gibson

GILRUTH CENTER NEWS

<http://www4.jsc.nasa.gov/ah/exc00a/Gilruth/Gilruth.htm>

Hours: The Gilruth Center is open from 6:30 a.m.-10 p.m. Monday-Thursday, 6:30 a.m.-9 p.m. Friday, and 9 a.m.-2 p.m. Saturday. Contact the Gilruth Center at (281) 483-3345.

Sign up policy: All classes and athletic activities are on a first-come, first-served basis. Sign up in person at the Gilruth Center and show a yellow Gilruth or weight room badge. Classes tend to fill up two weeks in advance. Payment must be made in full, cash or by check, at the time of registration. No registration will be taken by telephone. For more information, call x33345.

Gilruth badges: Required for use of the Gilruth Center. Employees, spouses, eligible dependents, NASA retirees and spouses may apply for photo identification badges from 7:30 a.m.-9 p.m. Monday-Friday and 9 a.m.-2 p.m. Saturdays. Cost is \$10. Dependents must be between 16 and 23 years old.

Nutrition intervention program: Six-week program includes lectures, a private consultation with the dietitian and blood analysis to chart your progress. Program is open to all employees, contractors and spouses. For details call Tammie Shaw at x32980.

Defensive driving: One-day course is offered once a month at the Gilruth Center. Pre-registration required. Cost is \$25. Call for next available class.

Stamp club: Meets every second and fourth Monday at 7 p.m. in Rm. 216.

Weight safety: Required course for employees wishing to use the Gilruth weight room. Pre-registration is required. Cost is \$5. Annual weight room use fee is \$90. The cost for additional family members is \$50.

Exercise: Low-impact class meets from 5:15-6:15 p.m. Mondays and Wednesdays. Cost is \$24 for eight weeks.

Step/bench aerobics: Low-impact cardiovascular workout. Classes meet from 5:15-6:15 p.m. Tuesdays and Thursdays. Cost is \$32 for eight weeks. Kristen Taragzewski, instructor.

Yoga: Stretching class of low-impact exercises designed for people of all ages and abilities in a Westernized format. Meets Thursdays 5-6 p.m. Cost is \$32 for eight weeks. Call Darrell Matula, instructor, at x38520 for more information.

Ballroom dancing: Classes meet from 6:30-7:30 p.m. Thursdays for beginner, 8:30-9:30 p.m. for intermediate and 7:30-8:30 p.m. for advanced. Cost is \$60 per couple.

Country and western dancing: Beginner class meets 7-8:30 p.m. Monday. Advanced class (must know basic steps to all dances) meets 8:30-10 p.m. Monday. Cost is \$20 per couple.

Fitness program: Health-related fitness program includes a medical screening examination and a 12-week individually prescribed exercise program. For information call Larry Wier at x30301.

DATES & DATA

September 27

Alzheimer's support group meets: The Clear Lake Alzheimer's Caregiver Support Group will meet at 7:30 p.m. to 9 p.m. September 27 in the first floor conference room, St. John Hospital West building, Nassau Bay. For more information, contact Nancy Malley at (281) 480-8917 or John Gouveia (281) 280-8517.

September 29

Astronomy seminar: The JSC Astronomy Seminar Club will meet at noon September 29 and October 6 and 13 in Bldg. 31, Rm. 248A. For more information, call Al Jackson at x35037.

Spaceland Toastmasters meet: The Spaceland Toastmasters will meet at 7 a.m. September 29 and October 6 and 13 at the House of Prayer Lutheran Church. For more information, call George Salazar at x30162.

Spaceteam Toastmasters meet: The Spaceteam Toastmasters will meet at 11:30 a.m. September 29 and October 6 and 13 at United Space Alliance, 600 Gemini. For information, call Patricia Blackwell at (281) 280-6863.

September 30

Communicators meet: The Clear Lake Communicators, a Toastmasters club, will meet at 11:30 a.m. September 30 and October 7 and 14 at Freeman Library, 16602 Diana Lane. For more information, call Allen Prescott at (281) 282-3281 or Mark Caronna at (281) 282-4306.

Radio Club meets: The JSC Amateur Radio Club will meet at 6:30 p.m. September 30 at the Piccadilly, 2465 Bay Area Blvd. For more information, call Larry Dietrich at x39198.

Inventors Luncheon: The 1999 JSC Inventors Luncheon, honoring inventors from December 1997 to December 1998, will be held at noon September 30 in Room 216 of the Gilruth Center. Cost is \$9.35 and reservations must be made by September 25. For additional information call x30837.

October 2

Star Party: The JSC Astronomical Society will host a public star party at Challenger 7 park October 2. For more information, call Chuck Shaw at x35416.

October 4

NSBE meets: The National Society of Black Engineers will meet at 6:30 p.m. October 4 at Texas Southern University, School of Technology, Rm. 316. For details, call Kimberly Topps at (281) 280-2917.

October 7

Warning System Test: The site-wide Employee Warning System will perform its monthly audio test at noon October 7. For more information, call Bob Gaffney at x34249.

October 8

Astronomers meet: The JSC Astronomical Society will meet at 7:30 p.m. October 8 at the Center for Advanced Space Studies, 3600 Bay Area Blvd. For information, call Chuck Shaw at x35416.

October 10

Westside NSS meets: The "Westside" group of the Clear Lake area chapter of the National Space Society will meet at 2 p.m. October 10 at Silicon Graphics, 11490 Westheimer, Suite 100. For information, call Murray Clark at (281) 367-2227.

October 12

Aero Club meets: The Bay Area Aero Club will meet at 7 p.m. October 12 at the Houston Gulf Airport clubhouse at 2750 FM 1266 in League City. For more information call Larry Hendrickson at x32050.

CLA-NSS meets: The Clear Lake area chapter of the National Space Society will meet at 6:30 p.m. October 12 at the Freeman Memorial Branch Library, 16602 Diana Lane. For more information call Murray Clark at (281) 367-2227.

NASA BRIEFS

NASA OCEAN RADAR WATCHES FOR BREAKUP OF ICEBERG

A NASA satellite instrument is keeping an eye on an iceberg the size of Rhode Island, the first time this space technology has been used to track a potential threat to international shipping.

NASA's new orbiting SeaWinds radar instrument, flying aboard the QuikScat satellite, will monitor Iceberg B10A, which snapped off Antarctica seven years ago and has since drifted into a shipping lane.

Iceberg B10A, which measures about 24 miles by 48 miles, was spotted by the instrument during its first pass over Antarctica, demonstrating SeaWinds' all-weather and day-night observational capabilities. The massive iceberg extends about 300 feet above water and may reach as deep as 1,000 feet below the ocean's surface. It is breaking up into smaller pieces that could pose a threat to commercial, cruise and fishing ships if the pieces are blown back into the shipping lane by high winds.

"Although the iceberg isn't posing a threat to ships in the area right now, pieces of B10A could be blown back into the shipping lane and become a danger to ships using the Antarctic's Drake Passage," said Dr. David Long, a member of the SeaWinds science team from Utah's Brigham Young University, Provo, UT. Long said that the SeaWinds instrument will be able to help scientists at the National Ice Center, Suitland, MD, track pieces of the iceberg down to about 2.5 miles in size.

X-34 ROCKET PLANE TO BEGIN EXTENSIVE TESTING

NASA's experimental X-34 rocket plane will undergo testing in New Mexico, California and Florida under a test plan recently approved by agency officials. Both schedule and cost implications are currently being evaluated.

To support the expanded flight test program, engineers from Dryden Flight Research Center and Orbital Sciences Corporation, Dulles, VA, will upgrade the first airframe, designated A-1A, for flight. Following a series of tow tests on the ground at Dryden, the A-1A will be used to conduct unpowered test flights from Orbital's L-1011 carrier aircraft at the Army's White Sands Missile Range.

At the same time, Orbital, NASA's contractor for X-34, will complete assembly of the second X-34, designated A-2. Its Fastrac rocket engine will be installed on the vehicle and test fired on the ground at Holloman Air Force Base, NM, test facilities. After these ground test firings, the first series of powered flight tests of the X-34 will take place at Dryden.

NASA SELECTS 103 SMALL BUSINESS PROJECTS

In an attempt to stimulate the development of new technologies, NASA has selected 103 research proposals for negotiation of Phase II contract awards for its Small Business Innovation Research Program. The selected projects have a total value of approximately \$62 million and will be conducted by 90 small, high-technology firms in 27 states.

In addition to stimulating innovation, the SBIR program aims to increase the number of small businesses, including women-owned and disadvantaged firms, conducting federal research and commercializing the results of federally funded research.

SPACE CENTER **Roundup**

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